

# **URBAN WATER MANAGEMENT PLAN**

**March 2007**

**CITY OF SOUTH GATE**

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## **PREFACE**

This Urban Water Management Plan for the City of South Gate has been prepared in response to the Urban Water Management Planning Act. This Act requires urban water suppliers to develop Water Management Plans to achieve conservation and efficient use. In preparing this plan, the City has made every effort to follow the guidelines provided by the California Department of Water Resources (DWR) regarding compliance with the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning). The City of South Gate is a member of the Central Basin Municipal Water District and coordinates many of its water related programs with the CBMWD. The CBMWD has also prepared an Urban Water Management Plan as a wholesaler and has submitted it to the California Department of Water Resources in November 2005. The CBMWD's plan addresses the general issues of its members' agencies including South Gate. The city, however, has decided to prepare a plan of its own to describe its individual needs and circumstances.

The City of South Gate has developed City ordinances to respond to water shortages which are discussed later in this report. In addition, the City now has reclaimed water available for its customers, and offers a 15% discount for the use of reclaimed water. These measures demonstrate City's commitment to water conservation. The City is also a participant in the Member Agency Response System (MARS), which was developed by the Metropolitan Water District of Southern California for its members' agencies. The MARS network was developed in a coordinated effort to improve emergency response and expedite mutual aid to participating agencies.

The City of South Gate is in a positive position to provide water service because of its adequate groundwater sources. This plan discusses the general supply and demand patterns and makes appropriate comments. The City of South Gate operates a municipal water utility located in an adjudicated water basin (the Court retains jurisdiction to assure a balanced Central Basin aquifer through a Judgment awarding groundwater pumping rights to water producers and the Court appointed Watermaster {Department of Water Resources} assists the Court in the administration and enforcement of the Judgment). The Utility has annual pumping rights of 11,183 acre-feet of water (one foot of water covering a surface area of one acre, or 325,851 gallons). The City manages and operates wells, conduits, pipes, fire hydrants, and reservoirs. The water system in South Gate is regulated through federal law, state law, the South Gate Municipal Code, and court decisions. The City currently extracts almost 11,000 acre feet annually and efforts to use recycled water and to conserve water are emphasized.

### **List of Abbreviations**

AF	Acre Feet
CBMWD	Central Basin Municipal Water District
CFM	Cubic Feet Per Minute
CFS	Cubic Feet Per Second
WR	(California) Department of Water Resources
GAC	Granular Activated Carbon
GPM	Gallons Per Minute
HP	High Pressure
kVA	Kilo Volt Ampere
KW	Kilo Watts
MGD	Million Gallons Per Day
MARS	Member Agency Response System
MCL	Maximum Contaminant Level
MG	Million Gallons
MPMP	Master Planning & Management Program (South Gate – May 2005)
MWD	Metropolitan Water District of Southern California
PCE	Tetrachloroethylene
PSI	Pounds per Square Inch
PVC	Polyvinylchloride (PVC Pipe)
SCAG	Southern California Association of Governments
SCE	Southern California Edison Company
TCE	Trichloroethylene
ug/L	Micrograms per Liter of Water
VOC	Volatile Organic Compound

## **Section I**

### **Plan Adoption, Public Participation, and Planning Coordination**

#### **Plan Adoption**

This Urban Water Management Plan (UWMP) has been prepared by the City of South Gate during the Summer of 2006. This plan is expected to be adopted by the City Council in March 2007 and will be submitted to the California Department of Water Resources within 30 days of the Council's approval. In preparing this plan, the City has made every effort to follow the guidelines provided by the California Department of Water Resources (DWR) regarding compliance with the requirements of California Water Code Division 6, Part 2.6 (Urban Water Management Planning).

#### **Public Participation**

The City of South Gate encourages public participation in various aspects of its planning as appropriate. The City and the Central Basin Municipal Water District (CBMWD) held a public hearing meeting regarding this plan March 27, 2007. As a result of that meeting the City will, however, continue to seek public participation through its water conservation ordinances and other appropriate means.

#### **Coordination Within the City**

Water management requires cooperation and coordination with other City departments including Administration, Community Development/Planning, Engineering, and Finance. These departments have cooperated in the preparation of many documents including Pavement Management Report, Sewer Master Plan, Water Master Plan, water conservation ordinances, and the proposed General Plan. Cooperation and communication are vital ingredients to develop practical projections of growth and future water demand.

#### **Interagency Coordination**

The City of South Gate is a member of the Central Basin Municipal Water District (CBMWD). The CBMWD is a public agency that purchases from the Metropolitan Water District of Southern California (MWD). The CBMWD wholesales imported water to cities, mutual water companies, investor-owned utilities and private companies in southeast Los Angeles County (imported water is transported through the Colorado River Aqueduct system and from Northern California). The CBMWD also supplies water used for groundwater replenishment and provides the region with recycled water for municipal, commercial and industrial use. There are 24 cities in CBMWD's service area and South Gate is a member city although we do not presently purchase water and meet demand through groundwater pumping. The CBMWD has prepared an Urban Water Management Plan as a wholesaler and has submitted the plan to the California Department of Water Resources in 2005. The CBMWD's plan addresses the general issues of its members' agencies including South

Gate. The City, however, has decided to prepare a plan of its own to describe its individual needs and circumstances.

### **Water Shortage Emergency Response**

The City of South Gate has adopted ordinances to respond to water shortage. The City is also a participant in the Member Agency Response System (MARS), which was developed by the Metropolitan Water District of Southern California for its members' agencies. The MARS network was developed in a coordinated effort to improve emergency response and expedite mutual aid to participating agencies.

## **Section II**

### **City of South Gate – History, Growth, and Water Facilities**

#### **History and Growth**

##### **General**

This section will describe the general characteristics of the City of South Gate and its growth history, along with some information regarding future planning for utility services. Developing orderly planning of utility services requires an understanding of the physical and economic characteristics influencing growth of the area under investigation. Physical factors of importance include geography, geology and climate. Economic characteristics of importance encompass industry, commerce, agriculture, and recreation. These factors affect the location, construction, and operation of the water supply and distribution facilities. They also have a bearing on land use patterns and population growth. This chapter summarizes information on the general characteristics listed above.

##### **The Physical Environment**

The City of South Gate is located in the urbanized area of southern Los Angeles County, a few miles south of downtown Los Angeles. The City provides water service to most of the area within the city limits. However, water service to one section, Hollydale, is provided by Golden State Water Company. Sewer collection and storm drainage is provided for all areas within the City limits. The City manages the sewer system and is maintained by the Sanitation Districts of Los Angeles County. The Los Angeles County Department of Public Works provides storm drain management. All sewage is carried away to be treated at the County's treatment plant.

The City of South Gate covers approximately 7.5 square miles of the south-central area of Los Angeles County. The City is bounded by an unincorporated area of Los Angeles County known as Walnut Park; cities of Huntington Park, Cudahy, Bell, and Bell Gardens, Downey, Lynwood, and Paramount. The City is located in the coastal plain at the confluence of the Los Angeles River and Rio Hondo. The terrain is gently sloping, ranging from 80 to 135 feet in elevation above sea level.

The topography of South Gate is dominated by the Los Angeles River (LA River) and Rio Hondo River. The LA River divides the City into eastern and western sections. Land west of the LA River gently slopes to the river. Land east of the river slopes toward the LA River or Rio Hondo. There are no significant hills or known faults within the City. The Newport-Inglewood fault is located about three miles to the southwest, the Whittier-Elsinore fault is about ten miles to the east, and the San Andreas fault is located about 40-miles to the northeast.



The climate of the City is moderate with average daily temperatures ranging from about 58 to 77 degrees Fahrenheit. Temperature extremes range from the mid 30s to low 100s. Precipitation averages about 14.4 inches annually.

### **Economic Environment**

The City of South Gate is a well-developed area with established land uses. The City is a blend of residential, commercial, and industrial zones which provide a compatible environment for its residents. A review of economic factors affecting South Gate provides a basis for evaluating and developing current population trends, future land use patterns, and projected water demand.

### **Commercial**

Commercial establishments in South Gate are located mainly along major arterials such as Firestone Boulevard, Atlantic Avenue, Tweedy Boulevard, and Long Beach Boulevard. The section of Tweedy Boulevard between Long Beach Boulevard and Hunt Avenue is considered the central business district of South Gate. In recent years, the number of commercial establishments has increased as development occurs and industrially zoned land is converted to commercial uses.

A proposed retail project is in preliminary entitlement process for a retail shopping center located on 32 acres on Firestone Boulevard just east of Atlantic Avenue. If approved, the retail center is expected to be operational in approximately 2008/2009.

### **Manufacturing**

South Gate is currently home to a number of major industries including Schultz Steel, Saputo Cheese, U.S. Gypsum, Armstrong World, Philadelphia Quartz Industry, and Koos' Manufacturing. In the 1980's, South Gate's industrial base changed as General Motors and Firestone Rubber closed manufacturing plants in the City. The City is updating the General Plan and industrial land use designations are not expected to change.

### **Agriculture**

In the past, South Gate was a predominantly agricultural area until the mid-1930, when urban growth replaced much of the farm land. Currently, there is very little land dedicated to agricultural production. Remaining agricultural land is located along the transmission utility right-of-way (owned by the Los Angeles Department of Water and Power and the Southern California Edison Company) adjacent to the Los Angeles and Rio Hondo Rivers and along a portion of Southern Avenue near Atlantic Avenue. The updated General Plan studies do not expect this agriculture use will change.

### **Recreation**

There are three major parks and a number of smaller parks located throughout the City. Athletic fields and picnic areas are available at both South Gate Park and Hollydale Park. The City owns and maintains a 9 hole, par-3 golf course, and a recreation center equipped with a swimming pool at the South Gate Park. In addition, there are ten elementary schools, two junior high schools and two senior high schools located in the City. There are playgrounds and recreation programs at the elementary schools and athletic fields are available for public use at the junior and senior high schools.

### **Population and Area Development**

A long-range plan for public utility system development requires analysis of future population and land use development projections. The General Plan for Land Use was completed in 1986 and this report provides projections. In that report, present population distribution and land use were reviewed, as well as future land use, population growth, and population distribution. These population projections form the basis for estimates of future water requirements and sewer flows, and enable a workable schedule for financing and construction of necessary public works improvements. Study summary:

#### **Population Analysis**

Historic population records and growth trends were reviewed as a basis for projecting future population levels. In addition, the South Gate Community Development Department (Planning and Transit Divisions), the California Department of Finance, the South Gate Chamber of Commerce, and the South California Association of Governments (SCAG) were contacted to obtain assistance for analyzing South Gate population trends.

Population growth for a city such as South Gate typically takes the shape of a logistic "S" curve. Early stages of development are characterized by a population growing at an increasing or geometric rate. The middle stages of development are characterized by a constant or linear population growth rate. Finally, as the city approaches full development, the population grows at a decreasing rate of growth until reaching the saturation population.

Although South Gate experienced a period of strong geometric growth in the 1930s and 1940s, the population continued to experience a moderate level of geometric growth through 1992 as shown in **Table 2-1**. This pattern of growth results from the City's commitment to revitalization which has encouraged redevelopment and higher population densities than originally anticipated. Although redevelopment projects are expected to continue, less than 3% of the City's land now remains vacant, and new development projects will be limited. As a result, population growth through 2010, the end of the project's planning period, is expected to increase but at a decreasing rate as South Gate approaches its saturation population.

Historically, population estimates for South Gate, including those made in 2005 Water Master Plan, has been low. For example, a 1989 SCAG estimate of 2010 population is 4.4 % lower than the actual population measured in the 1990 census. Past population projects have not fully accounted for higher densities resulting from development projects. However, for the City's MPMP a population project of 101,064 for the year 2005 was developed by linearly interpolating between the year 2000 and 2010 population projections made by the Planning Department in 1993. As shown in Table 2-1, this projection results in an annual percentage increase of 1.23 for the 13-year period, 1992 through 2005, which would be the lowest percent increase since 1970. While this reduced growth rate accounts for limited new development potential for the City as discussed above, it does allow for future growth in the form of continued higher density redevelopment projects. Compared to past population projections for South Gate, this population projection appears conservative, but practical.

**Table 2-1, South Gate Population, 1960-2020**

<b>Years</b>	<b>Population</b>	<b>Percent Increase</b>	<b>Average Annual Percent Increase</b>	<b>Average Annual Population Increase</b>
1960 1960-1970	53,831 -----	----- 5.7	----- 1.19	----- 308
1970 1970-1980	56,909 -----	----- 17.4	----- 1.33	----- 988
1980 1980-1990	66,784 -----	----- 29.2	----- 1.40	----- 1,950
1990 1990-1992	86,284 -----	----- 2.4	----- 1.56	----- 1,051
1992 1992-2005	88,836 -----	----- 12.4	----- 1.23	----- 917
2005	101,064	-----	-----	-----
2010	110,000	-----	1,077	-----
2015	111,810	-----	1,077	-----
2020	120,419	-----	1,077	-----

Note: Pre-1992 population data was obtained from the U.S. Bureau of Census. The 1992 data was obtained from the California Department of Finance.

The Community Development Department indicates the population estimates may contain population undercounts and that the number undocumented aliens residing in South Gate may be increasing, but this has not been substantiated. The extent to which the population of undocumented residents has been omitted from previous census, state and city statistics for South Gate is beyond the scope of the Major Planning and Management Program (MPMP) study. But, it cannot be assumed that this undercount has been consistent over the years. It is conceivable that the undercount of undocumented aliens has been increasing and will continue to increase. This justifies a conservative but practical planning approach. A projected population growth of 12.4 % for the period 1992-2005, based on the 1993 Community Development Department projections, was assumed to allow for estimated increases that could occur in the undocumented population.

### **Land Use**

The most current information on land use for South Gate comes from the 1986 South Gate General Plan and the 1993 Land Use classification/update per Chapter 2 of the "1996 Report." City staff has reviewed the information contained in these reports and have discussed current planning efforts in progress with the City Planning Department. City staff has also evaluated all parcels within the City and coordinated each parcel's land use classification with the Planning Department.

### **General Plan Land Use**

The City of South Gate Planning Department has approved the following land use categories:

Single Family Residential  
Multi-Family Residential  
Residential/ Landscaping  
Commercial- 1  
Commercial- 2  
General Industrial  
Railroad  
Flood Control Easement  
Easements  
Civic/Institutional  
Public Works  
Schools  
Schools with green area  
Park  
Vacant

Land use categorized as residential, commercial, industrial, and public/institutional comprise approximately 67% of the City's total land area of 3,779 acres. The remaining land consists of public parks, freeways, flood control right-of-ways, and railroad right-of-ways. Almost all of South Gate is developed with less than 60 acres remaining undeveloped or vacant. The composition of existing land use in South Gate by user category is shown on Table 2-2. The existing land use

distribution by user category is shown on Table 2-3.

**Table 2-2  
Existing Land Use by User Category (2004)**

<b>Land Use</b>	<b>Number of Parcels</b>	<b>Acres</b>
Single Family Residential	10,348	1374
Multi-Family Residential	3718	570
Residential Landscaping	1	6
Commercial-1	335	114
Commercial-2	598	228
General Industrial	467	719
Railroad	48	72
Flood Control District Easement	69	158
Easement/ Powerline R/W	129	86
Civil/ Institutional	127	73
Public Works	8	10
Schools	96	72
Schools with Green Areas	37	69
Parks	46	128
Vacant	191	60

Residential land uses account for approximately 43% of the City's total land area. In order to more effectively allocate water system demands, residential land use was separated into Single Family Residential and Multi-Family Residential.

Commercial land use includes neighborhood, community, and regional shopping centers; commercial sales and service; general office; medical office; and lodging. Commercial development is located primarily on commercial strips located adjacent to major arterials such as Firestone Boulevard, Long Beach Boulevard and Tweedy Boulevard and Hunt Avenue.

Commercial land uses account for approximately 7.1% of the City's total land area. In order to more effectively allocate water system demands, commercial land use was separated into Commercial 1 and Commercial 2. Commercial 1 is categorized as users with a daily average consumption of approximately 1200 gallons. Commercial 2 is categorized as users with a daily average consumption of approximately 4500 gallons.

Industrial land uses are concentrated in the northeastern, eastern and extreme western parts of the City. The southwestern industrial sites are currently occupied by warehousing and distribution sites. The northwestern industrial sites are currently occupied by a variety of industrial users, including light manufacturing and mineral processing sites. Another 110 acres of land developed for industrial land use, located in the northeastern and eastern industrial areas is currently unoccupied. In the ultimate land use scenario, 376 parcels totaling 160 acres change land use with respect to

current land use. The 160 acre total represents 60 acres of vacant land that are developed to the ultimate allowable land use and 100 acres that are redeveloped from existing land use. The large areas of concentrated redevelopment include two areas of new schools in the eastern/southeastern areas of the City. The composition of land use for Ultimate Build-out Condition in South Gate by user category is shown on Table 2-3. The Ultimate Build-out Condition land use distribution by user category is shown on Figure 2-3.

**Table 2-3**  
**Ultimate Build-out Condition Land Use by User Category**

<b>Land Use</b>	<b>Number of Parcels</b>	<b>Acres</b>
Single Family Residential	10,319	1370
Multi-Family Residential	3,703	570
Residential Landscaping	66	6
Commercial-1	358	108
Commercial-2	605	240
General Industrial	460	677
Railroad	48	72
Flood Control District Easement	65	66
Easement/ Powerline R/W	69	158
Civil/ Institutional	43	32
Public Works	129	73
Schools	183	133
Schools with Green Areas	117	80
Parks	106	147
Mixed use	47	29

## **Water Treatment and Distribution Facilities**

### **General**

This section describes the treatment and distribution facilities of the City's water system. The water supply sources are described in the next section.

### **Treatment**

The City treats the water pumped from Wells No. 13, 14, 18, and 19 to meet the requirements of the State Department of Health Services. Treatment processes are described below.

The water from Wells No. 13, 14, 18, and 19 is treated by 5,000 gallons per minute (GPM) spray aeration facility inside the 4 million gallon (MG) underground reservoir located in South Gate Park. In the past, these wells contain tetrachloroethylene (PCE) and have exceeded the maximum

contaminant level (MCL). This water is also chlorinated before being pumped into the system. The two chlorine injection points are located on the common well discharge header prior to the reservoir and on the booster pump discharge header downstream of the reservoir. The chlorine residual analyzer is located near the latter injection point.

The State Department of Health Services issued an approval letter to the City to operate this underground reservoir facility on June 28, 1994. This was based on the results of a feasibility study. The study was conducted on the water received from Well No. 14, in which the PCE concentrations varied from 5.2 microgram per liter of water (ug/L) to 8.2 ug/L. PCE levels are expected to be between 5 and 14 ug/L during the normal operation of the referenced wells. However, PCE is expected to be generally under 10 ug/L. The treatment process is based upon the concept that as a volatile organic compound, PCE has a higher affinity for air than for water, and will transfer from the water to the air on its own. However, the spray aeration system makes this transfer occur faster. This does so by breaking the water into tiny droplets using spray nozzles, and then exposing these droplets to large amounts of air. The spray system consists of 30 spray heads, each set at a 45-degree angle. An air to water ratio of 30:1 is used. The air flow is provided by two 15,000 cubic feet per minute (CFM) blowers which pull the air through the reservoir via two aboveground intake vents on the south side of the reservoir. For normal operation, the raw water should flow through the spray nozzles at 5,000 GPM and air should circulate at least at 2,000 CFM. The treatment proposal was considered quite feasible based on the pilot study and was approved for use.

## **Storage and Distribution**

### **Description of Storage Facilities**

There are two elevated tanks, four ground level tanks and one underground concrete tank. Storage facilities are made of steel except for the buried reservoir in the South Gate Park which is made of steel-reinforced concrete:

The elevated tanks on the distribution system are the Santa Fe Avenue (0.5 MG) and Salt Lake Avenue tanks (0.5 MG). Two ground-level steel tanks are located at Firestone Boulevard and the I-710 Freeway, referred to as the Hawkins Reservoirs and are rated at 2.5 MG each. There is also a pump station at this site which boosts the water from these tanks. All tanks were inspected and recoated in 2003. An additional two ground level tanks are located at Tweedy Boulevard between Well No. 26 and Well No. 27 and these are rated at 1.8 MG each. A booster pump station is located at this site which boosts the water from these tanks as well as auxiliary power supply in the event of an electrical power outage.

The 4 MG underground reservoir in the South Gate Park is made of steel-reinforced concrete. It receives water from Wells No. 13, 14, 18, and 19. This reservoir is equipped with a spray aeration system to remove VOC's from the water. There is a pump station at this site which pumps the water from this tank into the distribution system. This reservoir was put into service in 1994.

### **The Distribution System**

The system consists of one pressure zone with 50-70 pounds per square inch (PSI) being maintained at all times. The distribution system consists mostly of cement-lined cast iron piping, and has about 10% asbestos-cement pipes. There are also some steel and polyvinylchloride pipe (PVC) and ductile iron piping in the system. There are no major leakage problems. There are about 20 dead-ends equipped with blow-off valves and the system is flushed as needed. The City complies with the State's requirements on water-sewage line separation. There are no gravity or low head lines. The system has about 130 miles of main lines. About 24 miles of this consist of 4-inch unlined pipes and these are being gradually replaced by 6" ductile iron pipes. As part of an improvement project, the system has completed approximately 8 miles of piping replacement work already. The dead-ends will also be eventually be eliminated.

There are three booster pump stations in the system. One of them containing four booster pumps rated at 150 high Pressure (HP) each, is located at Firestone Boulevard and I-710 Freeway adjacent to the Hawkins reservoirs. These booster pumps can provide 2,800 GPM each. They pressurize the water from the Hawkins Reservoir. Wells No. 24 and 25 are also located here. There is also a 750 kilowatt (kW) diesel generator for emergency power interruptions to operate these boosters.

There is another booster pump station at the South Gate Park Reservoir site which has four vertical turbine pumps. These are rated at 150 HP each and can pump 2,200 GPM each and pump water from this reservoir into the distribution system. There is also a 1,000 kW generator for auxiliary/emergency power at this site.

The third booster pump station is located on Tweedy Boulevard between Well No. 26 (2541 Tweedy Boulevard) and Well No. 27 (2645 Tweedy Boulevard). This booster pump station is equipped with four variable speed vertical turbine pumps. These are capable of producing 2,500 GPM each and they pump water from the reservoir into the distribution system. There is also a 1,000 kW generator for auxiliary/emergency power at this site.



## Section III

### Past, Current, and Projected Water Supply and Worst Case Supply Projections

#### Local Ground Water

The City has fourteen groundwater sources. Eleven of these are active and the other three are standby wells. These wells are listed in the **Table 3-1** below. Generally, the wells produce water of acceptable quality. However, some exceptions were noted which are described below.

**Table 3-1, Groundwater Sources**

Well Number	Station Code	Status	Capacity (GPM)
Well No. 7	02S/12W-31MO2S	Standby	950
Well No. 13	03S/12W-06D01S	Active*	1,650
Well No. 14	03S/12W-06D02S	Active*	2,900
Well No. 18	03S/12W-06D03S	Active*	2,500
Well No. 19	03S/12W-06D04S	Active*	2,500
Well No. 22-B	03S/12W-05M01S	Standby	950
Well No. 23	03S/12W-06B03S	Standby	1,200
Well No. 24	02S/12W-31Q03S	Active	3,000
Well No. 25	02S/12W-31Q02S	Active	3,000
Well No. 26	02S/13W-34Q03S	Active	1,600
Well No. 27	02S/13W-34R01S	Active	1,800
Well No. 28	02S/13W-35A01S	Active	2,500

Total Capacity (Including Standby) = 24,550 GPM (32.976 MGD or 101.19 A.F. /day)

“\*” Indicates that the well water is treated to remove volatile organic compounds (VOCs) required by the State Department of Health Services before being pumped into the distribution system.

Well No. 7 has shown levels of trichloroethylene (TCE) above the MCL and its water is treated by granular activated carbon (GAC). The effluent is chlorinated prior to discharge into the distribution system. This well is approximately 8 feet from a steel encased 24 inch sewer line. Total coliform samples are collected weekly from this well. Any sewage contamination would be quickly detected.

Wells No. 13, 14, 18, and 19 have exceeded the maximum contaminant level (MCL) for tetrachloroethylene (PCE) in the past. Occasionally, other volatile organic compounds (VOC's) such as trichloroethylene (TCE) have also been detected. The water from these wells is treated by spray aeration inside the 4 MG reservoir located in the South Gate Park.

Well No. 22 B has shown levels of PCE above its MCL. Occasionally, VOC's have been detected.

### **Purchased Water Sources**

In addition to its own sources, the City also has interconnections to purchase water from other agencies. These sources are listed in **Table 3-2**.

Each MWD interconnection is rated at 15 cubic feet per second (CFS or 9.7 MGD), but the required pressure-reduction settings restrict the actual capacity to 4.25 CFS or 2.75 MGD for Central Basin No. 7 and to 2.9 CFS or 1.9 MGD for Central Basin No. 11. **Note, the City has not used purchased water during the last ten years and has relied on its own groundwater. This indicates that the City is not likely to face any disastrous situation due to water shortages in the foreseeable future.**

In addition to the above interconnections, the City's Hollydale area is served directly by an investor owned water utility, the Golden State Water Company.

### **Future Sources**

Potential plans for new sources are being considered at this time and will be addressed in the new Master Planning and Management Program. The City is working closely with the Central Basin Municipal Water District and the Water Replenishment District to consider expanded use of underground storage of water in the aquifer. This is referred to as "Conjunctive Use" and would benefit the City of South Gate. Conjunctive Use refers to the idea of storing water underground when it is plentiful, to be extracted during shortages.

Also, the City may consider the use of ultraviolet light and ozone to treat the Well No. 22-B water, so that it may be used as an active source. However, the City would need to prepare a demonstration study to show that the proposed treatment would reliably and consistently produce water of acceptable quality, before such treatment may be approved by the State Department of Health Services.

**Table 3-2, Purchased Water Sources**



<b>Name</b>	<b>Size (Inches)</b>	<b>Vendor</b>	<b>Location</b>
C.B. No. 7	16	Metropolitan Water District of Southern California	Southern Avenue at State Street
C.B. No. 11	16	Metropolitan Water District of Southern California	Southern Avenue at Kauffman Avenue
Downey	8	City of Downey	De Palma Street at Karmont Avenue
Lynwood	12	City of Lynwood	Santa Fe Avenue at Seminole Avenue
Huntington Park-1	6	City of Huntington Park	Santa Ana Street at Salt Lake Avenue
Huntington Park-2	6	City of Huntington Park	Santa Ana Street at Cypress Avenue
Huntington Park-3	6	City of Huntington Park	Santa Ana Street at Madison Avenue
Huntington Park-4	6	City of Huntington Park	Santa Ana Street at Victoria Avenue
Walnut Park	6	Walnut Park MWD	Santa Ana Street at Mountain View Avenue
Golden State Water Company	8	Golden State Water Company	Monroe Avenue at Garfield Street

Note: The Huntington Park-4 interconnection is inactive and is capped.

### **Recycled Water**

The City does not own or operate any water recycling facilities. The City is a member agency with the Sanitation Districts of Los Angeles County. The Sanitation Districts construct, operate, and maintain facilities to collect, treat, recycle, and dispose of wastewater and industrial wastes. Individual districts operate and maintain their own portions of the collection system. The City of South Gate is responsible for the collection of wastewater through local sewers and the collection of solid waste.

The Sanitation Districts treats sewer water and reclaims water. The water is treated to drinking water standards and allows to percolation into aquifers or be used to irrigate golf courses, landscaped medians, or be used in industrial processes. The City is using reclaimed water to offset use of potable water from the aquifer. Reclaimed water is purchased from the CBMWD and the City uses approximately 250 acre feet of reclaimed water in two City parks, Hollydale Park and Circle Park. There are also two carwash facilities in the City that recycle their own water. The reclaimed water line on Atlantic Avenue has enough capacity to provide for most of the industrial uses in that area, but the potential customers have not been motivated to use this resource. The City offers a 15% discount from the cost of potable water.

### **Frequency and Magnitude of Supply Deficiencies**

There have not been any major water shortage problems in the City. The westside had the potential for problems prior to the construction of the Westside Reservoir and booster pump station. The City has been working on a major plan for pipe replacement and has already completed the replacement of more than eight miles of piping. Water demand has been manageable and for the last fifteen years water was only used from an outside vendor for a period of six hours.

### **The Worst Case Water Supply**

The City of South Gate has been making system improvements and is positioning the enterprise to be a first class water utility. The City's own groundwater facilities have been sufficient to provide for its water needs during the last fifteen years. A worst case scenario would be loss of production at key water well facilities. In that case, the City will rely on purchased water, which can provide for essential needs. The City has standby wells which can be a significant source of supply. The City monitors growth in residential, commercial, and industrial developments requiring estimates of water usage to calculate increases in water demand. The City encourages use of recycled water and water conservation measures.

Worst case water shortages can be managed. Unless there is a significant water quality problem in the whole system, it is unlikely the City will need to import potable water.

### **Water Shortage Emergency Response**

The City's water conservation ordinances assist in reduction of water use. However, if a natural disaster such as an earthquake causes an emergency, the City is will follow the Member Agency Response System (MARS) of the Metropolitan Water District.

### **Supplemental Water Supplies and Water Transfers**

As previously explained, the City relies on its groundwater sources and its interconnections with other utilities. If an emergency occurs only within the City, the interconnected supplies can be of help. However, in case of an area wide problem, the City may be fully dependent on its own groundwater sources. Fortunately, the City's groundwater is sufficient to provide for the necessities of the residents. The City has not purchased water in the last ten years. In fact, the City is allowed

to pump 11,183 acre feet per year and had been leasing about 2,000 acre feet per year from 1991 until 2001. If water demand remains constant the City may be able to lease 500 acre feet of water rights beginning in 2008.

### **Long Term Additional Water Supply Options**

Water supplies used in Southern California come from several sources. Those sources include about half from imported water supplies and the other half from local supplies within the coastal plain of Southern California. The imported water sources are from Northern California via the State Water Project; the Colorado River; and the Los Angeles Aqueduct. Local supplies are primarily groundwater and Southern California mountain streamflow, recycled, and desalinated brackish groundwater. From a regional perspective the value of groundwater basins for water storage and distribution as part of a "conjunctive use" program may even exceed their value as sources of water supply. The City of South Gate is actively involved in pursuing a conjunctive use program as an alternative.

## **Section IV**

### **Past, Current, and Projected Water Use**

#### **Current Water Demand**

##### **Water Requirements**

Analysis of past and present water consumption and projections of future water demands are essential prerequisites in developing a water master plan. Analysis of historical water use determines trends that reflect population changes, land redevelopment, and meteorological cycles. Analysis of present water use determines the make-up of the City's current water users, and the magnitude of consumption by these users. From this analysis, water use by customer class, on a per acre basis, can be determined. Historical and present water use, in conjunction with planning information, is the basis for projecting future water demand.

In addition, to average water use by each customer type, it is important to determine the variations that occur in water use. Peak demands imposed on a water system determine system design, and therefore, the cost of pipelines and other water facilities. System water requirements to fight fires can often account for a large portion of the total cost of water system improvements. Similarly, hourly, daily, and seasonal water consumption variations influence the design of production, treatment and storage facilities.

Water production for South Gate is equal to the groundwater withdrawn by City wells plus any imported water purchased from MWD. It is the total amount of water introduced into the distribution system. Water produced by City wells and MWD connections are recorded by meters located at each production facility. Water consumption reflects water consumed by City customers as recorded by customer water meters. The difference between water production and water consumption is represented by unaccounted-for water.

Water demand is projected water consumption, or water that is currently desired, but not necessarily available. During a period of adequate supply, the amount of water that is desired will be consumed. During a period of restricted water availability, such as a drought, water consumption may be less than desired water demand if mandatory water conservation measures are imposed because of drought conditions.

##### **Historical Water Consumption**

Water consumption in the South Gate service area for the period of 1984 to 2006, is summarized in **Table 4-1**. The first year of California's recent drought was 1985, but water consumption peaked in 1985. The effects of voluntary water conservation can be seen in the following seven years, during which water consumption averaged less than 11,437 acre feet. This represents an 18% decrease in water consumption compared to 1985. In 1991, water consumption dropped to a low of 9,995 acre-feet which is 28% below water consumption in 1985. Water consumption for 1992

showed a 4% increase over 1991.

**Table 4-1, 1984 - 2006, Water Production**

<b>Year</b>	<b>MWD Production Acre-Feet</b>	<b>Well Production Acre-Feet</b>	<b>Total Production Acre-Feet</b>
1984	818.21	10,295	11,114
1985	596.76	11,795	12,392
1986	790.08	9,863	10,654
1987	1,204.48	8,864	10,068
1988	1,307.78	9,561	10,868
1989	457.53	10,444	10,902
1990	322.62	10,147	10,469
1991	0.00	8,869	8,869
1992	0.00	9,205	9,205
1993	0.00	9,178	9,178
1994	0.00	9,283	9,283
1995	0.00	9,665	9,665
1996	0.00	10,226	10,226
1997	0.00	10,192	10,192
1998	0.00	10,342	10,342
1999	4.09	11,510	11,514
2000	0.00	11,271	11,271
2001	0.00	10,941	10,941
2002	0.00	12,042	12,042
2003	0.00	10,795	10,795
2004	0.00	10,495	10,495
2005	0.00	10,745	10,745



2006	0.000	10,447	10,447
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### **Present Water Consumption**

The heavy period of rainfall that occurred from October 1992 through March 1993 officially ended the last drought cycle in California. With the official drought over, water consumption in South Gate was expected to increase. However, it was expected that water consumption would not increase at the same rate as before the drought due to water conservation habits developed during the drought.

For the City's Master Planning and Management Program, the water system computer model was calibrated for 2003-04 conditions, using an estimate of 2003 average water consumption. It was estimated that 2003 average water consumption in South Gate would be near the average water consumption for the 2005 year. This average water consumption of 10,447 acre-feet or 9.57 MGD represented a modest decrease of less than 1% over 2005.

### **Residential Sector**

Residential water consumption currently comprises about 76% of water consumed in South Gate. Residential land use includes: low, medium, upper-medium, and high density classifications in order to develop unit water use factors and to allocate demands.

Water consumption is divided evenly between low, medium and upper-medium density residential, each with about 33% of the total residential water consumption. The high density residential classification was developed to represent an eight-acre area in the southeastern section of the City. Water use for this user class is taken directly from billing records. This category consumes only 1% of the total residential water supply.

### **Industrial Sector**

Industrial water consumption accounts for about 7.5 % of water used in South Gate. About 60% of all industrial water consumption is consumed by six of the City's top 12 water users. These major industrial water users are: Saputo Cheese, Environmental Diotech, U.S. Gypsum Co., Philadelphia Quartz, Koo's Manufacturing, and Armstrong World. There is no more than 25 acres classified for industrial use that is unoccupied. This unoccupied industrial land currently does not have any water demand, but it is anticipated vacant parcels may develop and water demand will be studied for each development project.

### **Commercial Sector**

Commercial water consumption comprises about 10% of water use in South Gate. Among the major commercial water consumers are Rockview Farms and several laundromats.

### **Public/Institutional Sector**

Public/institutional water consumption includes schools, libraries, and City offices. It comprises about 3% of water used in South Gate. Public parks and several nurseries are classified as public.

### **Other Water Consumption**

Water used for irrigating the public parks and several nurseries located in the SCE right-of-way along the east bank of the Rio Hondo accounts for about 3% of total water consumption. These water users are discussed below under major water users.

### **Major Water Users**

Demand at the South Gate Park varies from 108 to 432 GPM depending on the number of sprinkler heads that are on-line. The parks are watered at night and the demand does not impact daytime water distribution. Other users include Koos Manufacturing, Saputo Cheese Company, U.S. Gypsum, and some others. Water consumption by these major users was not included in unit water use calculations because it is allocated separately.

### **Demand Conditions**

Analysis of a distribution system should be performed under a wide range of demand conditions. Demand conditions are time-dependent and should be considered in time increments varying from one year to one hour. By examining monthly demand variations, climatic and seasonal changes in demand can be seen. Hourly demand variations during the course of a day can be analyzed through analysis of diurnal demand curves.

The basic demand condition is the average demand that occurs over the course of an entire year and is referred to as average day demand. The maximum day demand is the highest demand that occurs during a 24-hour period over the course of an entire year. It is often the basis for designing a water system's supply capacity.

The demand conditions most limiting to the performance of system components are the maximum day demands taken in conjunction with the highest expected fire flow demand and the peak hour demand. Peak hour demand is the highest demand that occurs during a one-hour period over the course of an entire year. For a water system of South Gate's size, demand periods shorter than one-hour do not significantly alter design requirements and are not considered for analysis.

Monthly average water consumption for the period of 1984-1992 was reviewed during the MPMP study and is shown on **Figure 4-1**. Water consumption peaks at 121% of average in August, with a minimum water consumption of 81% of average occurring in February. Demand is highest in the summer months when additional water is needed for irrigating residential yards, public parks, greenbelts and nurseries. Also, more water is consumed during the warmer summer months. The seasonal variation in demand is primarily due to residential demand variation because large industrial and commercial water users use water at a more uniform rate throughout the year.

### **Diurnal Demand Curve**

A diurnal demand curve depicts hourly demand variation occurring throughout a given day. A representative curve was developed during the MPMP study for South Gate based on water system monitoring during a three-day period from January 15 to January 17, 1993. The curve is given on **Figure 4-2**. Demands are low in the early morning hours, increase in midmorning and remain steady, peak in the mid-evening and fall off during late evening hours. The general shape of a diurnal demand curve is not dependent upon the season. However, during the summer months, the volume of water consumed will be larger than during the winter months because of irrigation.

### **Maximum Day Demand**

The magnitude of a City's maximum day demand is dependent upon the number and type of customers served and the climatic conditions occurring during the summer months. Records of daily demand variation are not available for South Gate. However, typical maximum day demands range between 125 to 225% of the average day demand, with an average value of about 180% of average. For small systems or portions of larger systems, or for systems located in regions with extreme summertime temperatures, maximum day demands can exceed 225% of the average.

Considering the size and make-up of the South Gate water system, the mild summertime temperatures due to the coastal influence and maximum day demands reported by other Cities within this region, a maximum day demand of 180% of average was used for the study. This is consistent with a value of 175% of average used in the 1982 City's Water Master Plan.

### **Peak Hour Demand**

For a distribution system to provide high quality water service under all demand conditions, the transmission and distribution pipelines must be designed for the peak hour conditions occurring on the maximum day. Historic records of hourly demand variation are not available for South Gate. However, the peak hour demand for systems similar to South Gate's is typically about 150% of the maximum day demand, or 270% of the average day demand. Therefore a 2.7 average day to peak hour factor was assumed.

### **Demand Development**

During the referenced study, the average day demand was developed for current conditions in order to calibrate the water system model. Planning projections for population and land use were the basis for developing average day demands for the project's planning period, 1994 through 2005. Average day demands were developed by determining unit water use factors which show demand was determined, and the appropriate peaking factors were applied to determine maximum day and peak hour system demands.

### **Current Demand Development**

For the MPMP study, the average day water demand for 1993 was developed by first determining unit water use factors for each category of land use. Water use by 12 major users was subtracted from total water consumption totals prior to developing unit water use factors. Current unit water use factors were developed for each land use category based on meter records of selected sample areas throughout the City. The category water use factors for 1993 are shown in **Table 4-2**.

**Table 4-2, 1993 Unit Water Use Factors**

Land Use Category	Category Water Use - Gallons/Day/Acre
Residential	
Low density	2,400
Medium density	3,100
Upper-medium density	3,800
High density	12,000
Commercial	2,100
Industrial	335
Public/institutional	1,850

A 1993 average day system demand of 9.6 MGD resulted from adding the unit water use demands with the major user demands. Also for 1993, a maximum day demand of 15.6 MGD and a peak hour demand of 22.5 MGD were obtained by multiplying the average day demands, excluding major user demands, by the respective peaking factors developed above. Peaking factors were not applied to the major user demands because their demands remain fairly constant throughout the year.

### **1994 Demand (Projected Versus Actual)**

The 11-year planning period of the study runs from 1994 through 2005. Water system demands for 2004 were not expected to be significantly higher than water system demands for 2003, based on a projected annual population growth of 1.23 % for the period 2003 through 2004. Because of this, 1993 water system demands were used to simulate 1994 demands. As shown by the production date in **Table 4-1**, this was indeed the case.

### **Projected 2005 Demand**

In order to develop a phased capital improvement program, water system demands for 2004 must be developed. As previously discussed, most of South Get is developed, with less than 150 acres of land (3% of total) categorized as undeveloped. Land redevelopment from single-family to multi-family residential is expected to continue in order to accommodate the 1.24 % annual population increases projected by the City's Planning Department. Because of this, residential water use is expected to increase in direct proportion to population growth. Population growth is not expected to impact water use for other land use categories.

Land use for 2005 was taken from the land use policy map given in the 2004 General Land Use Plan. Based on a 1.23 % annual population growth, the population is projected to increase 10.5 % between 1993 and 2005. Average day demands for 2005 were obtained by multiplying the 1993 residential unit water use factors by a factor of 1.105.

The mixed residential/commercial use unit water use factor was obtained by adding together the medium density residential and commercial unit water use factors at a 60 to 40% ration. Similarly, the mixed commercial/industrial unit water use factors at a 25 to 75% ratio. Unit water use factors developed for 2005 are shown in **Table 4-3**.

**Table 4-3, 2005 Unit Water Use Factors**

<b>Land Use Category</b>	<b>Category Water Use - Gallons/Day/Acre</b>
Residential	
Low Density	2,650
Medium Density	3,425
Upper-medium Density	4,200
High Density	12,000
Mixed Use	
Mixed Residential/Commercial	2,630
Mixed Commercial/Industrial	775
Commercial	2,100
Industrial	335
Public/Institutional	1,850

Excluding the prospective major industrial user demand, average day system demand for 2005 was calculated to be 10.4 MGD. Also for 2005, a maximum day demand of 17.2 MGD and a peak hour demand of 24.6 MGD are obtained by multiplying the future average day demands, excluding the major user demands, by the respective peaking factors developed above.

### **Demand Simulations**

Water system response to selected demand conditions were also analyzed through computer simulation of the water system model. As a result of this simulation, some improvements in the system piping were considered beneficial. The improvement project is already underway and about 8 miles of piping have already been replaced.

## **SECTION V**

### **Water Conservation Programs**

#### **City Regulations**

The City has been active in water conservation. It has adopted Ordinances Nos. 1867 and 1960 for this purpose. Both of these are designed to reduce water usage, especially during shortages. The City encourages and may also, by using the above ordinances, require users to use reclaimed water for landscaping. There are also other measures that are required by these ordinances to ensure that the water waste or unnecessary use of potable water is reduced. Based on the Ordinance No. 1960, the City has also prepared specific guidelines for water conservation and landscaping. The Ordinance No. 1960 is designed to place certain water conservation requirements upon new and rehabilitated landscaping for industrial, commercial and multifamily residential developments. It does so by requiring submittal of landscaping plans prepared in accordance with the City's guidelines.

#### **Reclaimed Water**

The City is using reclaimed water in two of its parks and further applications are possible. The City offers a 15% discount to its customers for using reclaimed water. Expanding the use of reclaimed water would reduce pumping of potable water. Alternatives will be reviewed to determine new uses and applications.

## **Section VI**

### **Water Shortage Contingency Analysis**

#### **Water Shortage Response**

The City of South Gate has adopted the Ordinance No. 1867 to respond to water shortages. This Ordinance amends Title 6 of the South Gate Municipal Code by adding a new chapter 6.64 relating to the implementation of water conservation measures. This ordinance is referred to as the "Water Conservation Ordinance."

This ordinance authorizes the City Council to protect the public health, safety and welfare when it is determined there will be a water shortage. The City Council will determine by resolution the water conservation plan. The City Council may implement water conservation measures in addition to those specified in this ordinance.

#### **Rationing Stages and Reduction Goals**

Ordinance No. 1867 has three phases of water conservation:

Phase I places some restrictions upon the use of water for washing down driveways and other similar exteriors, washing vehicles, use of decorative fountains and other fixtures, water served in restaurants, water leakage loss, landscaping water waste, etc. It also requires some large users to submit a water conservation plan.

Phase II restricts landscape irrigation to two to three days per week at certain hours of the day to minimize water waste. Commercial nurseries and growers are exempt.

Phase III restricts landscape irrigation to one to two days per week at certain hours of the day to minimize water waste. Commercial nurseries and growers are required to observe these restrictions.

#### **Priority by Use**

City Ordinances establish a lower priority for use of water to such uses as the commercial and industrial landscaping and washing down driveways or washing vehicles. The second step is to reduce the residential landscaping applications. Finally, the general water use by commercial and industrial users is reduced. The City will provide water to residential users.

#### **Health and Safety Requirements**

The City's priority is not to reduce the availability of potable water for domestic use by residential customers, fire suppression, and the maintenance of health and safety. The conservation ordinances and program establish processes for reducing landscape use of water and curtail commercial and industrial water use.

#### **Water Shortage Stages and Triggering Mechanisms**

The determination of water shortage and implementation of the Water Conservation Ordinance is to be made by the City Council. The Water Department provides reports and recommendations to the City Council regarding implementation of any water restriction measures.

### **Water Allotment Methods**

Water allotment is focused on maintaining water service for public health and safety. The goals are to provide residential customers with sufficient water to provide for their needs including normal sanitary uses. Fire suppression is a primary goal to protect life and property. Landscaping water uses will be curtailed.

### **Rate Structure Under Rationing**

The Ordinance No. 1867 authorizes the City Council to impose a surcharge to the existing water charges paid by water customers. Such emergency charges may be imposed whenever a significant shortage in the potable water supply is anticipated.

### **Mandatory Prohibitions on Water Wasting**

A person violating any provision of Ordinance No. 1867 is committing a misdemeanor. Upon conviction, misdemeanor violations are punishable by a fine or imprisonment or both.

### **Mechanisms to Determine Reduction in Water Use**

City customers are metered and the Water Department reviews water use to assess the need to reduce water consumption.



## **Section VII**

### **Recycled Water Opportunities**

The City does not own or operate any water recycling facilities. The City is a member agency with the Sanitation Districts of Los Angeles County. The Sanitation Districts construct, operate, and maintain facilities to collect, treat, recycle, and dispose of wastewater and industrial wastes. Individual districts operate and maintain their own portions of the collection system. The City of South Gate is responsible for the collection of wastewater through local sewers and the collection of solid waste.

The Sanitation Districts treats sewer water and reclaims water. The water is treated to drinking water standards and allows to percolation into aquifers or be used to irrigate golf courses, landscaped medians, or be used in industrial processes. The City is using reclaimed water to offset use of potable water from the aquifer. Reclaimed water is purchased from the CBMWD and the City uses approximately 250 acre feet of reclaimed water in two City parks, Hollydale Park and Circle Park. There are also two carwash facilities in the City that recycle their own water. The reclaimed water line on Atlantic Avenue has enough capacity to provide for most of the industrial uses in that area, but the potential customers have not been motivated to use this resource. The City offers a 15% discount from the cost of potable water.

The City is planning on expanded use of reclaimed water for medians, and park facilities where possible. It may be necessary in the future to require landscaping on private property to use reclaimed water. A program to educate and guide the potential customers about the benefits and safety of the reclaimed water will be pursued.

Reclaimed water is less expensive to acquire and it the best means to reduce potable water use.

## **Section VIII**

### **Conclusions and Recommendations**

#### **Conclusions**

The City of South Gate's water system is not likely to suffer from any disastrous water shortages in the foreseeable future. The City's own groundwater sources are adequate for its needs and the City has interconnections which can be activated during emergencies. The City also has storage facilities and is planning to add more such facilities. The City has adopted a Water Master Plan in 2005 is planning system improvements. The City has reclaimed water available and encourages commercial and industrial customers to participate in the reclaimed water program.

The City of South Gate has developed ordinances to conserve water. The City is a participant in the Member Agency Response System of the Metropolitan Water District of Southern California which provides back up water delivery services in the event of major natural disasters or emergencies.

#### **Recommendations**

The City of South Gate has identified water system improvement needs in the 2005 Water Master Plan. Since the adoption of the report the City has completed the installation of a new water well (Well No. 28) and is planning to add a reservoir to that site. Old water line systems located in the western portion of the City are being considered for replacement as funds are available.

The City has been working closely with the Central Basin Municipal Water District and the Water Replenishment District to consider conjunctive use water storage in the aquifer. Climate change has been the focus of discussion and the City and region must take steps to store water for longer drought cycles.

The City is planning for future development citizens have requested a "greening of the City." This can be accomplished by using drought tolerant plants and installation of water systems to manage usage. Over the long term, reclaimed water may be used in residential areas for landscaping and recreational and school fields may be required to use synthetic grass. Encouraging industrial use of reclaimed water will reduce use of potable water.

The City's water delivery capacity and service are good. The focus on the future is oriented to system improvements and upgrades as necessary.